# Concurrent Photon Emission, Changes in Quantitative Brain Activity over the Right Hemisphere, and Alterations in the Proximal Geomagnetic Field While Imagining White Light

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***Abstract*- In order to replicate and extend the observation that inner light during meditation was associated with specific changes in brain activity, quantitative EEG measurements were completed simultaneously with measurements of photon emissions (with a photomultiplier tube) while three subjects (one concentrative meditator, two non-mediators) imaged an inner white light. There were consistent strong (r=0.5) correlations between photon emission from the right side of the head and changes in power within the right prefrontal-central regions. The quantitative convergence of the energies associated with photon emission, change in cerebral power, and the minute decrease in the local adjacent geomagnetic field in the same plane as the photon emission, suggests that experience of an "inner light" may reflect actual photon production whose energies are shared with changes in the proximal intensity of the geomagnetic field in the plane associated with photon emission.**

***Keywords- Quantitative EEG; Alpha/Beta Ratios; Meditation; Inner Light; Photon Emission; Geomagnetic Activity; Resonance***

## I INTRODUCTION

One of the most significant insights and experimental verifications in recent human civilization occurred during the latter portion of the nineteenth century when the energy associated with mechanical devices and biological systems was demonstrated to be effectively the same phenomenon. When Helmholtz's concept that energy can be neither created nor destroyed but simply change form was realized, the existence of a process permeating all forms of matter and space, including living systems, set the conditions for "infinite" possibilities. Schrödinger's [1] question "What is life?" reiterated a physicochemical connection to biological processes. When Bohr [2] and others suggested that human thought and consciousness could be viewed as quantum phenomena the interaction between what has been called the inner energy from spiritual and meditational traditions and the energy generated by neuronal metabolism and activity acquired a rational bases for exploration.

Light is a narrow band of electromagnetic energy that displays both particulate and wave characteristics. From a human perspective the perception of light occurs as a psychophysiological transformation of a narrow band of wavelengths between 400 nm and 800 nm with frequency equivalents between $7.5 \cdot 10^{14}$ Hz to $3.8 \cdot 10^{14}$ Hz (assuming the velocity of light) with energies (frequency multiplied by Planck's constant) of $4.9 \cdot 10^{-19}$ J to $2.5 \cdot 10^{-19}$ J. The perception of white light is a common report from people of diverse cultures while they engage in transcendental procedures or experience spiritual energies. Practitioners of Buddhism interpret inner energy as the fundamental radiance of the fundamental nature or true self of human beings in contrast to their corpuscular (molecular) or phantasmal self. Within these contexts, the experience of light has been correlated with wisdom and eternal life.

Lo et al. [3] reported a significant correlation between the perception of inner light during Zen meditation and the suppression (blocking) of electroencephalographic activity within the alpha (8 to 13 Hz) band. Recently we [4] have measured quantitative increases in photon emissions by a photomultiplier tube from the right hemisphere (but not the left hemisphere) of normal human volunteers while they were sitting in the dark and imaging a bright white light compared to the reference period of simply relaxing. The increased light emission was about $10^{-11}$ $W \cdot m^{-2}$ or about 100 times more intense than the background cosmic ray incidence ($10^{-13}$ $W/m^2$). The actual energy from the cross-sectional area of the right hemisphere was $\sim 10^{-12}$ $J \cdot s^{-1}$ or W. According to neuroquantum estimates where the action potential ($\Delta V = 1.2 \cdot 10^{-1}$ V) from an axon generates an energy on a unit charge ($1.6 \cdot 10^{-19}$ A·s) of $\sim 2 \cdot 10^{-20}$ J, this would be equivalent to about $10^7$ neurons firing around 10 Hz. This number of neurons is within the range estimated to be activated during neurocognitive processing of specific tasks.

The strong association between the emission of photons from the right hemisphere rather than the left in most people is consistent with the special characteristics attributed to this half of the cerebrum. Kurup and Kurup [5] noted that individuals who live a "spiritual" life showed more right hemispheric characteristics as well as the neurochemistry

associated with this region. Slight right hemispheric dominance nightly is associated with dream (Rapid Eye Movement) sleep and other altered states that may allow sensitivity to stimuli otherwise ignored or below the threshold of awareness. It is relevant that increases in geomagnetic activity appear to preferentially affect electroencephalographic activity within the right hemisphere [6] but during special states enhances electrical lability and sensitivity by, in part, reducing the levels of nocturnal melatonin from the pineal organ [7].

Given the powerful effects reported by Lo et al. [3] we decided to discern if the experience of a white light by two normal volunteers and an experienced meditator would display a quantitative relationship in real time between the emission of photon energy from the brain and specific electroencephalographic activity. In other studies [8] we reported that an internationally known psychic, Sean Harribance, displayed marked increases in photon emissions from his right hemisphere when he experienced white light that he attributed to a spiritual source. During this state, which was associated with a specific configuration of quantitative electroencephalographic (QEEG) activity, he experienced detailed information about people that only they knew. However the QEEG and photon measurements were not completed simultaneously. The purpose of the present study was to examine the real-time association between changes in QEEG activity when two non-meditators and an experienced meditator focused upon generating "inner white light" and photon emissions from the brain. We report here that there is a moderately strong correlation between these two measures and the associated energies are within the same order of magnitude.

## II MATERIALS AND METHODS

On three separate days one meditator and two non-meditators were recruited as subjects to participate in a study investigating the effects of imagining light. They were told that they would be asked to periodically imagine white light within a dark room. Subjects were between 23 and 28 years of age. The mediator had practiced daily for four years.

In this study, photon emissions were measured with a Model 15 Photometer from SRI Instruments (Pacific Photometric Instruments) with a photomultiplier tube (PMT) housing (BCA IP21) for an RCA electron tube with no filters; one PMT unit was equal to $5 \cdot 10^{-11}$ $W \cdot m^{-2}$. We measured photon emissions over the right hemisphere only. We have found that the most robust effects have been observed within the right hemisphere when individuals are asked to imagine light [4].

We recorded brain activity with a Mitsar-201 portable EEG (QEEG). Measurements were recorded from 19-areas of the brain in accordance with the 10-20 International Standard of Electrode Placement. All impedances were kept under 10 kOhms and data acquisition and artifact correction was completed with WinEEG software which sampled at 250Hz. We also recorded the horizontal (north-south; east-west) and vertical intensities of the earth's magnetic field 25 cm near the subject's head using a MEDA FZM-400 magnetometer.

Upon consent to participate the subject was asked to sit in a comfortable chair and was fitted with the electrode cap which recorded brain activity. The PMT was then placed approximately 25 cm away from the right hemisphere. Two separate experimenters controlled the QEEG and PMT in a room separate from the subject. Once baseline measurements were completed to insure sensitivity of the instrumentation the room was darkened and the experiment began. The magnitudes of the photon emissions and magnetometer measurements were recorded 3 times per sec by two different laptop computers.

During the experiment the participants were asked to 'imagine light around the body' for approximately 30-60 and then to subsequently 'relax'. This procedure was then completed 3 times in the experiment, which took about 10 minutes to complete. PMT, QEEG and magnetometer measurements were taken continuously throughout the experiment.

After the data were collected, the QEEG samples were segmented into 1-second intervals and were entered into spectral analysis which was completed for two bands: high alpha (10-13 Hz) and high beta (25-30 Hz). All spectral analyses were completed with Matlab V7 software for Windows. To measure the degree of alpha-blocking, we computed a ratio between alpha and beta. Hence values greater than one indicated a greater ratio of alpha power to beta power and values less than 1 indicated alpha blocking (beta>alpha). PMT, spectral data, and magnetometer data were imported into SPSS V.17 for Windows for further statistical analysis.

## III RESULTS

The results of the fine, quantitative measurements supported the hypothesis that brain activity and photon emissions from the brain are systematically correlated. As shown in Fig. 1, the real time absolute values of the correlations between photon emissions and electroencephalographic power were moderately strong and indicated that the fluctuations in amplitudes of photon emissions and the ratio of alpha/beta activity shared about 25% of the variance. This association was found primarily between whole right hemispheric photon emission and the electroencephalographic power within a specific region of the brains: the right prefrontal-central areas.

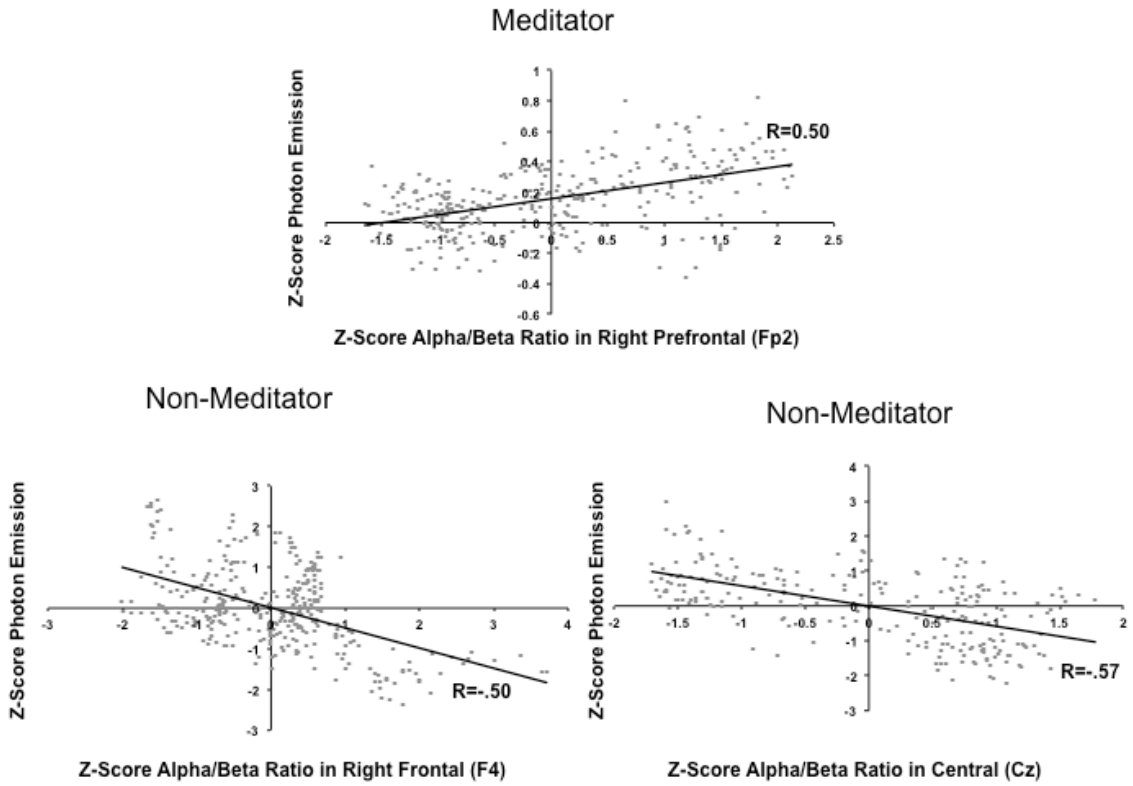


Fig. 1 Correlation between magnitude of photon emissions from the right side of the head and EEG power over the right rostral areas during imagining white light for three separate subjects

The real time relationships between the photon emissions and the alpha/beta activity ratio are shown in Fig. 2. There are two conspicuous effects which are similar to our previous results [9]. First, there was a temporal relationship between photon emission and this specific band of brain activity. Second, for the meditator the periods of voluntarily thinking about white light was associated with increased photon emissions from the brain and more alpha suppression.

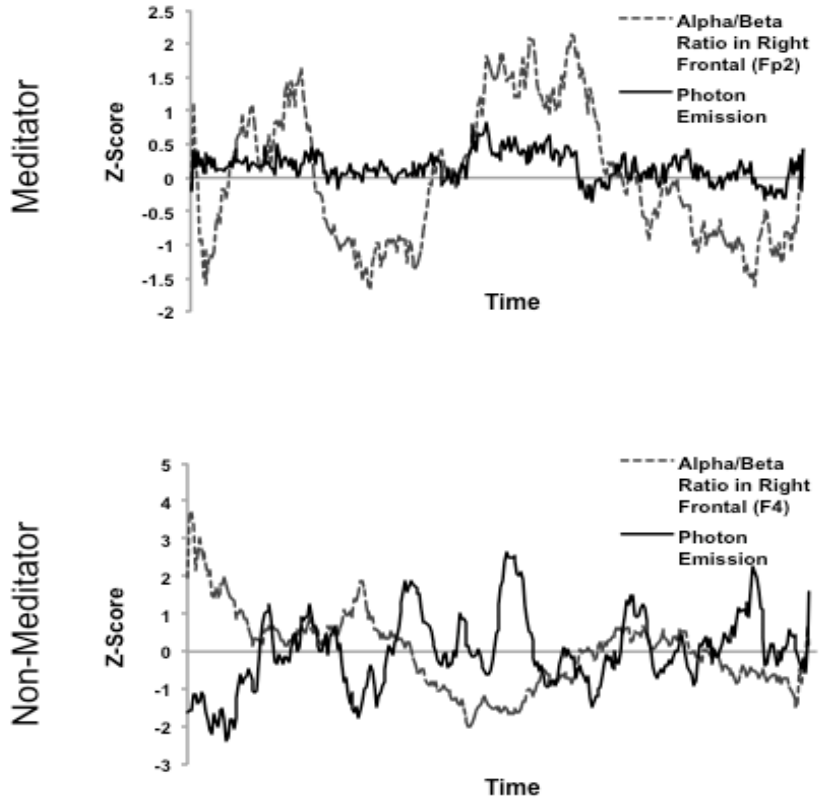


Fig. 2 Z-scores for real time changes in alpha/beta activity power ratios and photon emissions from the right side of the head

The two periods of imaging white light and increased photon emissions and power ratios are very evident for the meditator.

The results of the coupled, real-time measurements of the changes in the earth's magnetic field intensity at 25 cm from the right side of the meditator's head and concurrent photon emission were similar to the measurements of Sean Harribance [8] while he focused upon the "inner light" during which time he reported information about others. Factor analysis of 3,500 successive 0.3 s samples from both the photomultiplier tube and magnetometer revealed two factors: the first dominated by reciprocal changes in the components parallel (loading r=-0.89) and vertical (r=0.83) to the plane of the meditator's head (eigen value=1.65; 41% of the variance). The second factor (eigen value=1.16, 29% of the shared variance) was loaded exclusively by increased intensity of photon emissions (0.62) and decreased intensity from the horizontal geomagnetic component (-0.83) distal to the brain. This factor was significantly stronger when she was creating the inner light vs not.

The overall slope of the change in photon emission with changes in the geomagnetic field was -.05. This means that for every 10 nT decrease in the intensity there was 0.5 increase in the photon emissions. The equivalent decrease in geomagnetic activity would be equivalent to an energy shift of $J=(B^2/(2\cdot 4\pi\mu))\cdot$volume or about $10^{-11}$ J within the spherical volume at the distance around the person's head. It is also within the range, although weaker, of a similar inverse relationship between change in proximal geomagnetic intensity and photon emission from Harribance when he focused upon "white" light.

## IV DISCUSSION

Despite the apparent impedance from previous scientific conventions that have often diminished the importance of subjective, and apparently non-physical, intangible experiences, modern neuroQuantology and neuroscience suggests there is verifiable congruence between the phenomena associated with spiritual traditions and quantitative changes in brain activity. However the energies are very minute and required the technology and perspective to discern them.

The magnitude of the changes in photon emissions from the brains of our volunteers was in the order of $10^{-11}$ J which is more than 10,000 times less than the light from the stars on a moonless night. However these energies were quantitatively associated with the shift in frequencies that we measured as alpha-to-beta ratios in real time. Both measures required quantitative measurements and adjustments for the individual differences between subjects. The power density ($W\cdot m^{-2}$) would be only about an order of magnitude above the cosmic ray incidence upon the earth's surface.

As reported by Lo et al. [3] there was a clear relationship between the experience of white light by the subject with a long history of meditation and suppression of alpha activity. In our study the non-mediators showed the increased photon emission with greater relative alpha rhythm suppression while the meditator showed the opposite effect. In other words the greater alpha suppression was associated with less photon emission while generating inner white light. For the two non-meditators the conditions associated with more biophoton emission was associated with alpha suppression. The reason for this apparent reversal is unclear, although the meditator was practiced in concentrative rather than contemplative techniques more typical of Zen Buddhism. When we employed the narrower band of beta activity employed by Lo et al. [3] we did find similar effects although they were much weaker.

We have measured an approximately 5 to 10 nT decrease in the earth's magnetic field proximal to the head of the subject during increased photon emissions on several occasions. This decreased intensity of the geomagnetic field would not be the same as the cerebral magnetic fields whose intensities are in the order of picoTesla. In the present study photon emission from the meditator increased as the strength of the earth's magnetic field in the same plane as the photon emission decreased, the identical effect observed with Harribance [8]. If there is a shared source of variance between the diminished intensity of the geomagnetic field near the head during experiences of white light or inner light and increased release of photons, then the mechanisms for access of information over large distances could be explored.

That thinking is associated with quantum-level energies was suggested by Bohr decades ago. Recently Bokkon and his colleagues [see 4] have developed a series of quantitative proofs that photons are emitted during visual imagery, including dreaming and that photon fields are the visual images. In other words thoughts and images are not necessarily only the psychophysical equivalent of patterns of neuronal action potentials and changes in membrane states. The experiences are awareness of photons. That living tissue release photons, the mitogenetic radiation of the 1920s and 1930s, is now being re-investigated. The human being emits ~$10^7$ of photons$\cdot s^{-1}\cdot m^{-2}$. Assuming a mid-range wavelength of 500 nm or about $4\cdot 10^{-19}$ J, this would equivalent to about $10^{-12}$ $W\cdot m^{-2}$. Slices of the hippocampus, the "gateway to memory", emit about $10^{-12}$ $Wm^{-2}$ of photons whose amplitude are phase locked with theta activity [10, 11].

An interaction between photons and the plasma membrane would require a critical temporal congruence. For example the passage of a photon through a 10 nm cell membrane is $10^{-16}$ s. This is the time required for one orbit of an electron around the nucleus of the Bohr magneton. This condition would be optimal for the neuronal plasma membrane associated with thinking and consciousness to interact with the energy associated with the passage in or out of the brain with photons moving through space. That the biophoton effect associated with imaging white light is measured clearly over the right hemisphere but not the left appears to be intrinsic to the phenomenon [12]. The discrepancy is not an obvious proportion related to the marginally greater white matter, vascular flow or electroencephalographic potential difference within the right compared to the left hemisphere. It may reflect its properties [13].

Kobayashi et al [11] reported the largest photon emissions during increased oxygen utilization occurred over the right frontal region of rodents.

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